

# THE GLOBE WE LIVE ON A BOMBING BOMB

## How Earthquakes are Manufactured Down in the Earth's Molten Bowels.

MAKING, it seems, is the natural and constant condition of the earth. This is the conclusion of modern science.

We have just been warned in the State of New York that we are subject to earthquakes. Even in quiet, steady-going England they have lately felt shocks.

What is the original cause of an earthquake? It is possible that there are several causes, but seismologists are generally agreed that there is one very common one.

Deep down in the earth's crust some great smashes. There is a jarring and the jarring shock is sufficient to send ripples to the ground the strongest of man's shocks on the surface of the earth. This jarring is then the commonest cause of earthquakes.

The smashing is due to the unequal contraction of the earth. This planet is cooling its heat, and in the process it contracts. If the contraction were equal all round it would be well, but it cannot be, for the earth's crust is made of materials of varying consistency.

One part offers more resistance than another, but at last it gives way under the overwhelming accumulation of the contracting force. Then there is a break, and a fissure, in some vast stratum of rock. One side of the fissure as it sinks down grinds against the other, which is sliding slowly or not at all.

The jarring caused in this way is something difficult for the human mind to conceive. If a man could hear the sound with any intervening miles of earth it would kill him dead. Billions of tons of material are involved in such a cataclysm.

The falling wall of a fissure may grind against its opposing wall for several thousand feet. In such a case no buildings within hundreds of miles of its surface can remain standing.

Sometimes it must be inferred several of these internal smashes of the earth take place within a limited area and within a short time of one another. Then whole continents are shaken.

The smash frequently occurs at a "fault" stratum of rock. This is a place where stratum is weak or there is an actual break.

The contracting force grinds the two sides of the rock together, or else a mighty rift from above crushes down through weak place. Geologists find traces of these vast distortions of the earth exposed on the surface by the denudation of ages.

There is one striking illustration near Avalanche Lake, in the Adirondacks.

The surface of our earth is forever moving up and down like the waves of the ocean. This is one of the external accompaniments of the internal smashing and sliding that take place. Where elevation and subsidence is greatest there are earthquakes commonest.

It is a proof that elevation has taken place, that scientists point to raised beaches, sea-worn rocks, raised coral reefs and the remains of many sea organisms, all of which are now on coasts high above the level of the best tides.

Proof that subsidence has taken place is furnished by submerged forests, the progradation of valleys beneath the bed of the ocean, and even the submergence of works of human construction.

The western shores of South America have risen more rapidly than any other region of large extent in the world, and this also more earthquake shaken than any other.

At Valparaiso, during the last 220 years the rise has been nineteen feet. For the fifteen years prior to 1817, the rise was seven feet. Similar remarks apply to Japan.

It is probable that some earthquakes are the result of internal explosions. Water in great quantities falls down through a fissure in the earth until it reaches a superheated stratum. Then it is turned into gas with a suddenness that makes an explosion.

Volcanic eruptions are presumably the result of these explosions. It has been observed that when a volcano is active the surrounding country is generally free from earthquakes.

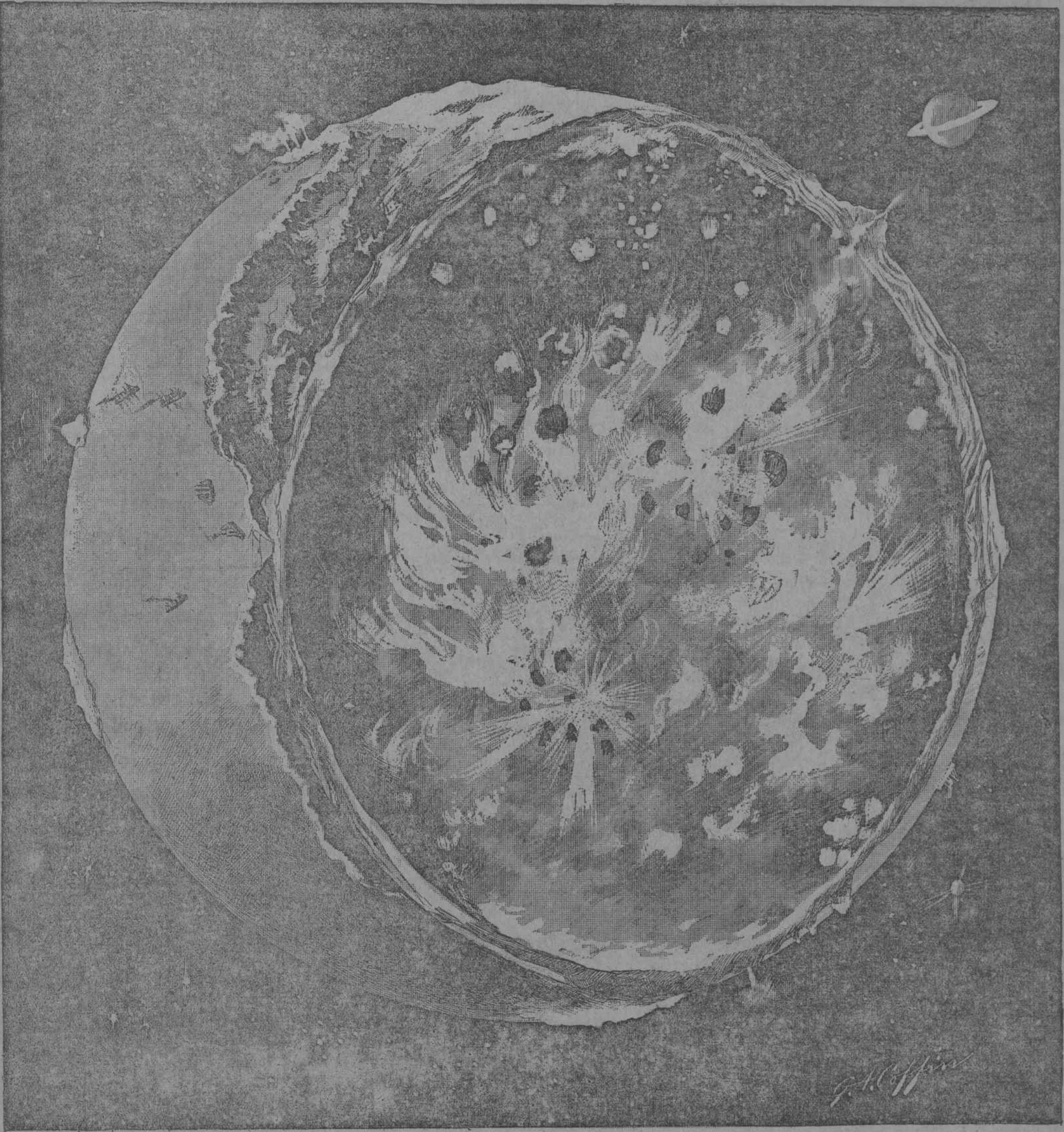
An earthquake, as we feel it, is a series of waves of vibration travelling through the ground. The force is transmitted from a molecule to another, while the particles themselves hardly move from their original positions, just as a blow struck on one end of a stick will drive away a ball sitting at the other end, although the stick itself remains in one place.

A slight shock striking a house in the air will shake the cornice from the front, the vibrations run upward diagonally from the ground at the rear to the front.

The source from which an earthquake originates is called the "origin," "focal point" or "centrum."

The point or area on the surface of the ground above the origin is called the "epicentrum."

The radial lines along which an earthquake



What Happens Inside of the Earth When It Is In the Mighty Throes of Its Own Convulsions.

quake may be propagated from the centre, or it may be propagated from the surface of medium equidistant from the epicentrum equal mechanical effects. These points will lie on circles called "isoseismic" or "cosismic" circles. In nature, however, isoseismic lines are seldom circles. Irregular curves are the more common forms.

Earthquakes originating under the bed of the sea sometimes raise huge waves, more terrible in its effects than an earthquake on the solid surface. People who are on the coast during an earthquake can reach the open country during an

### PROF. KEMP TELLS WHY MOTHER EARTH SOMETIMES GETS CRACKED.

The Earth's Crust, He Says, Is To-day Like the Wrinkled Skin of a Dried Apple and a Trifling Disturbance Inside Sets Things to Quaking.

The recent earthquake shocks in the State of New York remind us that no portion of the earth's surface is likely to be altogether free from such disturbances.

When we speak of earthquakes we must bear in mind that we are dealing with the depths of the earth. We live on the surface of a sphere 8,000 miles in diameter, but we only know by observation about ten miles of its outer crust. We infer that the interior is hot from the volcanoes and from the increase of temperature as we go down in mines or as we test deep boreholes with the thermometer.

It used to be thought that the interior was molten, and therefore the hard exterior was called a crust—a use of terms that is still continued, although we know that the interior is practically solid from the pressure of the outer portions.

This planet is radiating its heat into space, and there is good reason for believing that as it loses heat it contracts. This contraction causes the outer portion or crust to crumble and crack from time to time. The crust resembles to-day very much the wrinkled skin of a dried apple.

When the earth adjusts itself along a crack it causes an earthquake. The rock on one side of the crack slips down, and the jarring produced by this slipping

But "The interior is practically solid."

Naturally, such earthquakes would be most frequent in volcanic districts, where there is hot molten lava within a limited distance of the surface. Water introduced into a fissure containing molten matter would cause an explosion.

It is also known that molten lava is sometimes forced into a fissure in solid rocks with violence, and this might start vibrations. Volcanic countries are likewise most favorable for earthquakes of this type.

JAMES F. KEMP, Professor of Geology, Columbia University.

June 9, 1907.

"It Used to Be Thought the Interior Was Molten."

"Some Earthquakes Are the Result of Explosions of Steam."



WHAT YOU MAY SEE THESE FINE SPRING AFTERNOONS IN AFRICA ALONG THE 600-MILE CYCLE PATH FROM THE COAST TO UGA

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earthquake of an enormous of miles a m The awful Lisbon in 1755 sea bed off, waves which city rose to coast of Ireland five feet. In Japan, which cause feet high. wave eight In 1893 P destructive which was felt at the away, with 10,000 miles were also Their rate South Am repeatedly The first drawing ba well known waves that used it as ard the hill terrible res Professor original an fect of ear He bells earth to b fluid reser which by sun the f cracks co tremendol earthquak As Fall wholly di and moon He has d celebrity In 1878 quake of eulogisti eruption He b theories great floo he has f of the other gr

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